2011 Canandaigua Lake Sampling and Monitoring Program

Report to the Canandaigua Lake Watershed Council
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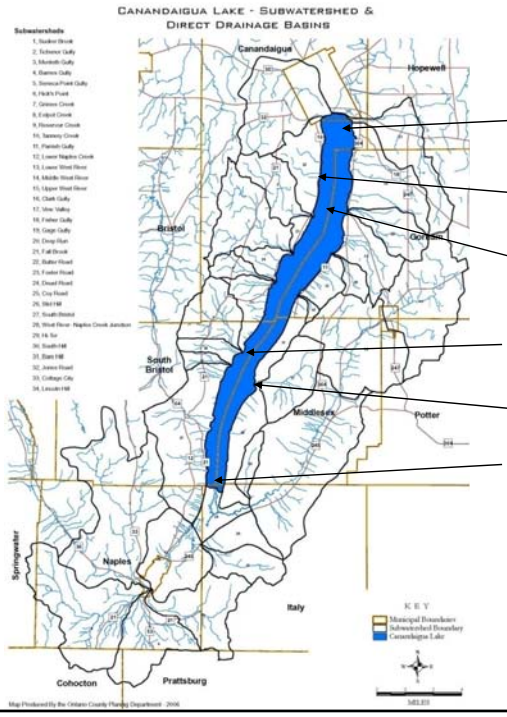
Science-based Assessment of Lake Health

- Multiple Parameters
  - Water quality profiles
  - Water clarity
  - Lake nutrients
  - Lake algal productivity

- Modeling: Trophic State Index
- Relate lake results to watershed data (storm information, stream quality, LULC)

Lake Sampling and Monitoring Protocol (1996-present)

- Data taken in the last week of the month, April through November
- Water quality profile from the surface to maximum depth of 60 meters
- Nutrient grab samples at 2, 25 and 50 meters below the surface
- Chlorophyll *a* samples from six locations, integrated through the photic zone



Fallbrook (FB)

Hope Point (HP)

Deep Run (DR)

deep water locations

Seneca Point (SP)

Vine Valley (VV)

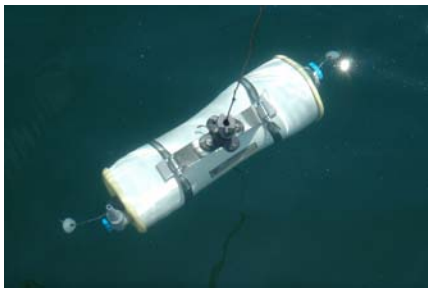
West River (WR)

In-situ monitoring

- YSI water quality profile of temperature, dissolved oxygen, conductivity and pH. These parameters provide an assessment of lake health.

- Lake clarity by secchi disk reading of water transparency

Lake Clarity by Secchi Disk



Van Dorn Sampler

for

Nutrient Grabs

Integrated Column

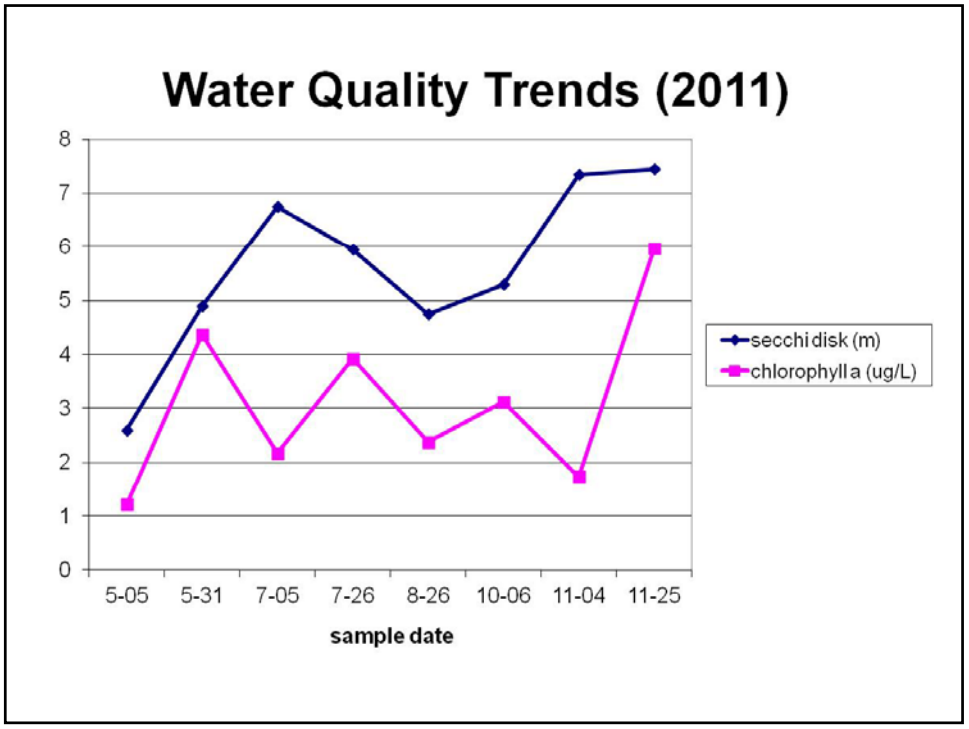
across the Photic Zone

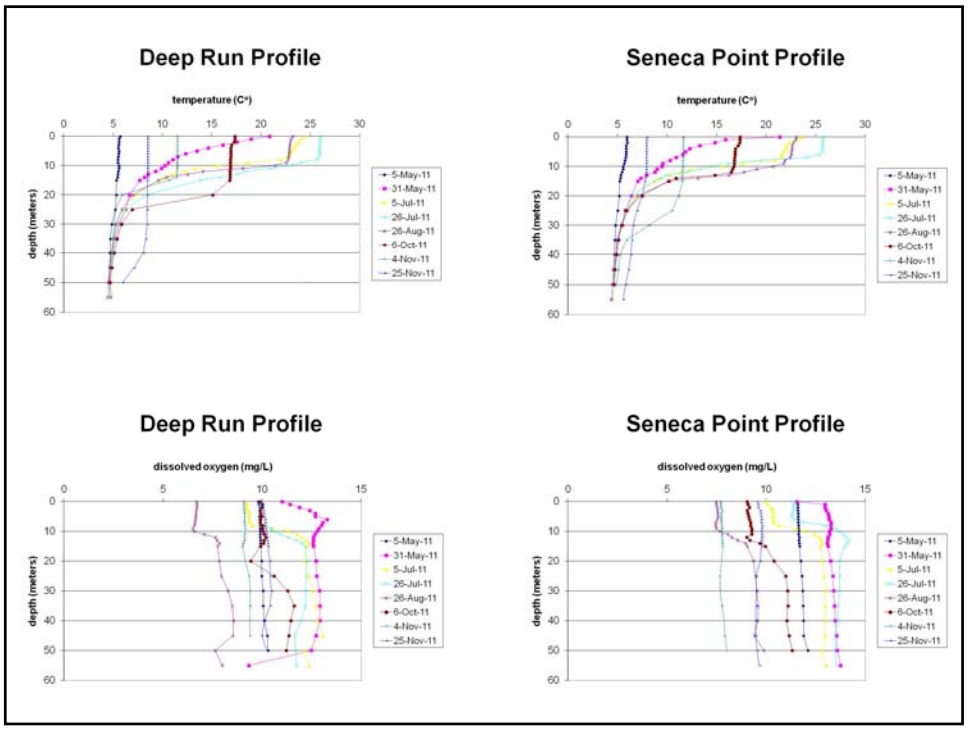
for

Chlorophyll "*a*"

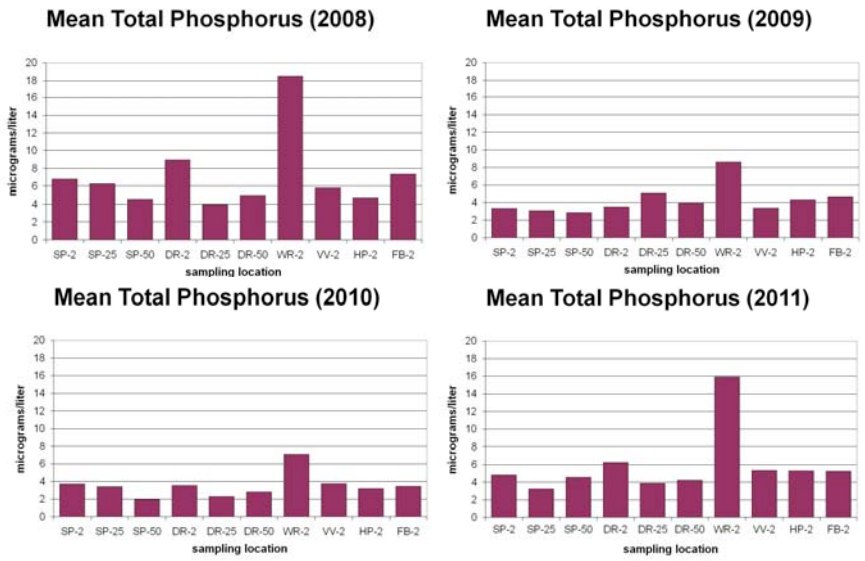
Follow-up Laboratory Analyses

- Nutrients – amount of total phosphorus (TP), the limiting factor supporting aquatic plant growth and, therefore, an indirect measure of lake primary productivity
- Chlorophyll "*a*" – an estimate of algal abundance and, therefore, a direct measure of lake primary productivity


Water Quality Trends (2011)
8
7
6
5
4
3
2
1
0
5-05
5-31
7-05
7-26
8-26
10-06
11-04
11-25
sample date
secchi disk (m)
chlorophyll a (ug/L)

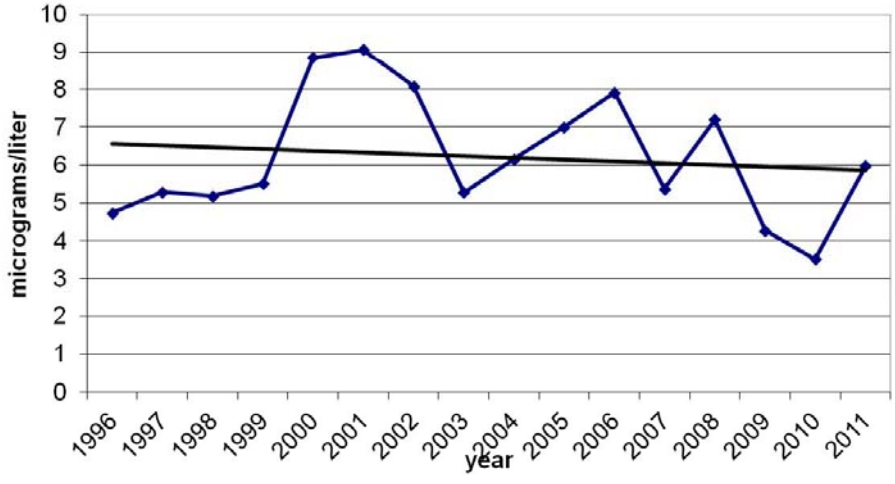

Deep Run Profile
temperature (C°)
depth (meters)
Seneca Point Profile
temperature (C°)
depth (meters)
Deep Run Profile
dissolved oxygen (mg/L)
depth (meters)
Seneca Point Profile
dissolved oxygen (mg/L)
depth (meters)
5-May-11
31-May-11
5-Jul-11
26-Jul-11
26-Aug-11
6-Oct-11
4-Nov-11
25-Nov-11

Total Phosphorus by Location



Mean Total Phosphorus

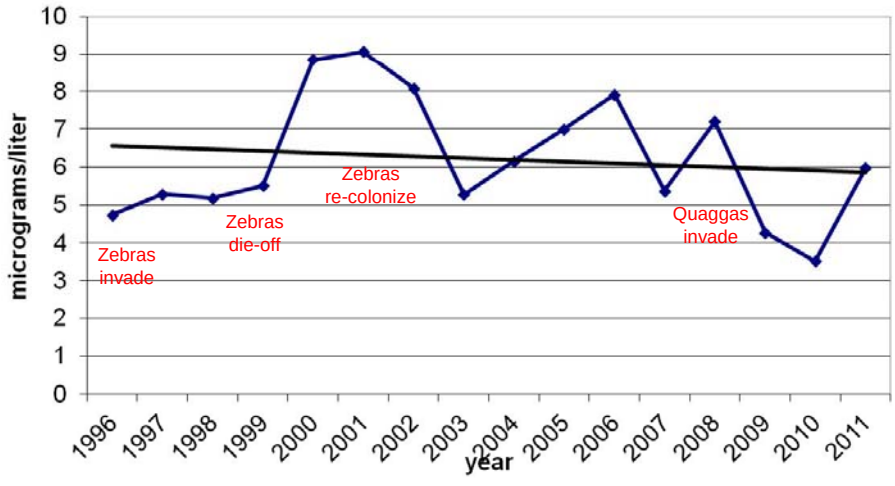
2010 was the lowest concentration for our years of record



What affects the phosphorus budget?

- We think that <u>less</u> phosphorus has been entering the lake
  - Effective watershed protection programs have reduced external loading of phosphorus
- We realize that <u>more</u> phosphorus could be entering the lake
  - More intense storm events have produced locally high runoff
- We are beginning to understand how biologically bound phosphorus affects the levels that we detect
  - Changing role of invasive quagga and zebra mussels living in the benthic zone of the lake
- The combination of external sources and internal biological sources impact the overall level of phosphorus in the lake

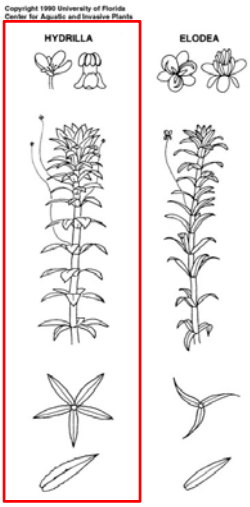
Mean Total Phosphorus



Aquatic Macrophyte Survey (thirteen locations along lake shoreline)

Submerged Species

- *Bidens beckii* water marigold
- *Ceratophyllum demersum* coontail
- *Elodea canadensis* waterweed
- *Heteranthera dubia* water stargrass
- *Myriophyllum spicatum* Eurasian water milfoil
- *Najas guadalupensis* southern naiad
- *Potamogeton amplifolius* large-leaf pondweed
- *Potamogetn crispus* curly leaf pondweed
- *Potamogeton epihydrus* ribon-leaf pondweed
- *Potamogeton gramineus* grass-leaf pondweed
- *Potamogeton perfoliatus* clasping leaf pondweed
- *Potamogeton richardsonii* red-head pondweed
- *Potamogeton zosteriformis* flat-stem pondweed
- *Ranunculus longirostris* stiff white water buttercup
- *Vallisneria americana* eelgrass



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Aquatic Macrophyte Survey (continued)

Floating-leaved Vascular Species

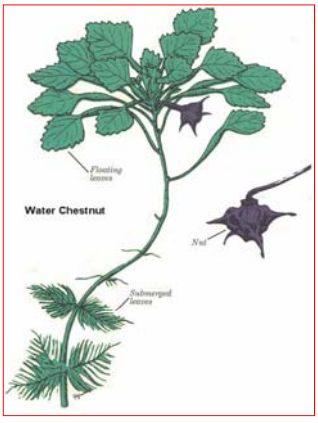
- *Lemna minor* lesser duckweed
- *Nuphar variegata* yellow waterlily
- *Nymphaea odorata* white waterlily
- *Wolffia columbiana* water meal

Emergent Vascular Species

- *Iris pseudoacorus* yellow iris
- *Peltandra virginica* arrow arum
- *Pontederia cordata* pickerel-weed
- *Sagittaria latifolia* arrowhead
- *Scirpus validus* soft-stem bulrush
- *Sparganium eurycarpum* giant bur-reed

Macro-algae

- *Chara vulgaris* muskgrass



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Questions?